COMPOSITE ZINC-FLY ASH COATING
ON
MILD STEEL

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ABSTRACT

The corrosion was one of the most crucial issues which mankind has been faced. Corrosion naturally impacts our daily life trough chemical reactions that occur on the surface of metal and will impair the function of metal. In addition, the production of waste fly ash from a thermal power plant shows an increasing each year and been disposed at the landfill. One of the solutions to prevent corrosion occurs on metal by coated the surface of metal. Recently, fly ash found that have a potential to work as an anti-corrosion agent because of the composition of fly ash rich in metals such as iron (Fe), aluminium (Al), silicon (Si) and magnesium (Mg). The objectives of this paper were to study the corrosion behaviour and to study the physical properties of anti-corrosion zinc –fly ash coating. Therefore, Zinc-fly ash coatings were deposited on mild steel substrates with used sodium silicate as a binder. Zinc powder and fly ash powder was being sieved first in order to get the fine powder for composite coating and mix with sodium silicate. The surface of mild steel has been coated with zinc-fly ash coating. The physical properties of zinc-fly ash coating were being tested by an adhesion test by the cross-cut method. The corrosion behaviour of coating were being tested by immersion test in 3.5% sodium chloride (NaCl) solution for 30 days and potentiodynamic polarization curve in 3.5% sodium chloride solution. The results form adhesion test found that by the addition of fly ash in composite coating increased the adhesion strength of the coating than without fly ash. The result from immersion test concluded that the addition of fly ash had less rested on the surface of mild steel. The result of potentiodynamic polarization curve show the zinc-fly ash coating exhibits a more protective film than a pure composite zinc coating with 50% compared to pure zinc coating.

ABSTRAK

Pengaratan adalah salah satu isu yang sering dihadapi dan berlaku secara semulajadi. Pengaratan boleh memberi impak kepada kehidupan kita melalui tindak balas kimia yg berlaku di permukaan logam dan akan menjejaskan fungsi logam. Di samping itu, pengeluaran sisa abu terbang dari kilang kuasa haba menunjukkan peningkatan setiap tahun dan telah dilupuskan di tapak pelupusan. Salah satu penyelesain untuk mencegah logam berkarat dengan melapiskan cat dipermukaan logam. Baru baru ini, abu terbang didapati mempunyai potensi untuk berfungsi sebagai agen anti karat kerana komposisi abu terbang yang kaya dengan logam seperti besi (Fe), aluminium (Al), silikon (Si) dan magnesium (Mg). Objektif kajian inin adalah mengkaji tingkah laku pengaratan dan mengkaji sifat fizikal zink-abu terbang cat. Oleh itu, zink-abu terbang didepositkan pada substrat keluli dengan natrium silikat yang digunakan sebagai pengikat. Serbuk zink dan serbuk abu terbang ditapis untuk mendapatkan serbuk yang halus untuk komposit cat dan dicampurkan dengan natrium silikat dan permukaan keluli telah disalut dengan cat zink-abu terbang. Ciri-ciri fizikal zink-abu terbang cat telah diuji dengan ujian lekatan. Ciri-ciri pengaratan diuji dengan ujian rendaman dalam larutan 3.5% natrium klorida selama 30 hari dan pengiraan polarisasi potentiodinamik dalam 3.5% larutan natrium klorida. Keputusan dari ujian lekatan mendapatin bahawa dengan menambah abu terbang dalam komposit cat akan meningkatkan kekuatan lekatan cat berbanding tanpa abu terbang. Hasil daripada ujian rendaman mendapati bahawa penambahan abu terbang akan mengurangkan pengaratan terhasil. Hasil keputusan ujian pengiraan polarisasi potentiodinamik menunjukkan zink-abu terbang cat mendapati terbukti mengurangkan pengaratan sebanyak 50% berbanding dengan cat tanpa abu terbang.